AMENDMENT

(1) (Amended) A reduced size printed dipole antenna element comprising:

(a) A dielectric substrate,

(b) Two conducting patches, one at each end of the dipole element, on one side of said dielectric substrate,

(c) A conducting strip, narrower than the patches, connecting the two said conducting patches, with a feed point at the center, forming a radiating part of the dipole element.

(d) Slots cut into said conducting patches to effectively extend the length of the said conducting strip, and

(e) A second conducting strip on the reverse side of said dielectric substrate, forming a parallel strip transmission line with said conducting strip and electrically connected to said conducting patches through the use of via holes in said dielectric substrate.

(2) (Amended) A reduced size printed monopole antenna ~~as in claim (1) further comprising a mounting on a ground plane~~, comprised of one half of the dipole antenna in claim 1, mounted on a ground plane, with said conducting strip driven and said second conducting strip connected to said ground plane.

(3) (Amended) A parasitic reduced size printed dipole antenna element comprising:

(a) A dielectric substrate,

(b) Two conducting patches, one at each end of the dipole element, on one side of said dielectric substrate,

(c) A conducting strip, narrower than the patches, connecting the two said conducting patches, forming a radiating part of the dipole element.

(d) Slots cut into said conducting patches to effectively extend the length of the said conducting strip, and

(4) (Amended) The parasitic reduced size printed monopole ~~antenna as in claim (3) further comprising a mounting on a ground plane~~ comprised of one half of the dipole antenna in claim 3, mounted on a ground plane.

~~(5)~~ (withdrawn) ~~A Yagi-Uda type directional array comprising~~:

~~(a) Any number of parasitic reduced size printed dipole antenna element of claim (3), and~~

~~(b) the reduced size printed dipole antenna of claim (1);~~

~~whereby number of parasitic reduced size printed dipole antenna element and said reduced size printed dipole antenna are positioned on a substrate.~~

(6) (withdrawn) ~~A broadside array comprising;~~

~~(a) a first substrate having any number of reduced size printed dipole antenna element; and~~

~~(b) a second substrate with a feed structure whereby said feed structure consists of parallel strip transmission lines whereby said first substrate is perpendicularly connected to said second substrate.~~

(7) (withdrawn) ~~A stacked broad side array comprising:~~

~~(a) the broad side array as described in claim (6)~~

~~(b) a number of parasitic broad side arrays each comprising a number of the parasitic reduced size printed dipole antenna elements of claim (3) whereby they are positioned on any side of said broad side array.~~

(8) (withdrawn) ~~A stacked array of the Yagi Uda arrays as described in claim (5) whereby said stack comprises of any numbers of said Yagi uda Arrays connected by a second substrate with a feed structure whereby said feed structure consists of parallel strip transmission lines~~.

9.- (New) A reduced size printed dipole antenna comprising:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on each side of said dielectric substrate; and

(c) via holes;

wherein, the patterned region on the front side of said substrate forms a linear, driven conductor and at least one loading patch; said driven conductor has a feed point and two ends; said driven conductor being excitable at said feed point; each said loading patch being connected to an end of said driven conductor, and, each said loading patch being shaped to effectively extend the length of said driven conductor; and wherein, the patterned region on the reverse side of said substrate forms a linear, undriven conductor; and

wherein, said undriven conductor is parallel to said driven conductor, and said undriven conductor is electrically connected to said driven conductor through said via holes.

10.- (New) The reduced size printed dipole antenna of Claim 9 wherein feed point is at the center of said driven conductor.

11.- (New) The reduced size printed dipole antenna of Claim 9 wherein said via holes are positioned at one end of said driven conductor such that said driven and undriven conductors form a folded dipole.

12.- (New) The reduced size printed dipole antenna of Claim 9 wherein said driven and undriven conductors form a parallel strip transmission line.

13.- (New) The reduced size printed dipole antenna of Claim 12 wherein the dielectric constant of said dielectric substrate, the lengths of said driven and undriven conductors, and the size and shape of said patches are selected such that said transmission line is anti-resonant at the same frequency at which the antenna is resonant.

14.- (New) A reduced size printed monopole antenna comprising:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on each side of said dielectric substrate;

(c) a ground plane; and

(d) via holes;

wherein said dielectric substrate is mounted over said ground plane; and

wherein, the patterned region on the front side of said substrate forms a linear, driven conductor and at least one loading patch; wherein said linear, driven conductor has a first end and a second end and each loading patch is connected to the first end of said linear, driven conductor, and each said loading patch is shaped to effectively extend the length of said driven conductor; and

wherein said linear, driven conductor is excitable by an external conductor; and

wherein the patterned dielectric region on the reverse side of said substrate forms a linear, undriven conductor; wherein said linear, undriven conductor has a first end and a second end; wherein said undriven conductor is parallel to said driven conductor; and wherein the first end of said linear, driven conductor is electrically connected to the first end of said driven conductor through said via holes; and wherein the second end of said undriven conductor is directly connected to said ground plane.

15.- (New) The reduced size printed monopole antenna of Claim 14 wherein a dielectric constant of said dielectric substrate, the lengths of said driven and undriven conductors, and the size and shape of said patches are selected such that a double-tuned response is obtainable.

16.- (New) The reduced size printed monopole antenna of Claim 14 wherein said ground plane is a conducting ground plane.

17.- (New) The reduced size printed monopole antenna of Claim 14 wherein said external conductor is fed through said ground plane and electrically attached to said driven conductor.

18.- (New) The reduced size printed monopole antenna of Claim 14 wherein said external conductor is mounted on said ground plane and electrically attached to said driven conductor.

19.- (New) The reduced size printed monopole antenna of Claim 14 wherein said external conductor is printed on said ground plan and electrically attached to said driven conductor.

20.- (New) The reduced size printed monopole antenna of Claim 14 wherein said dielectric substrate is perpendicularly mounted on said ground plane.

20.- (New) The reduced size printed monopole antenna of Claim 14 wherein said dielectric substrate is perpendicularly mounted on said ground plane.

21.- (New) A parasitic reduced size printed dipole antenna element comprising:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side; and

(b) a patterned region on said front side of said dielectric substrate;
wherein, the patterned region on the front side of said substrate forms a linear conductor and loading patches; said linear conductor having a first end and a second end; wherein at least one loading patch is connected to said first end of said conductor, at least one loading patch is connected to said second end of said conductor, and each said loading patch is shaped to effectively extend the length of said conductor.

22.- (New) A parasitic reduced size printed monopole antenna element comprising:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on the front side of said dielectric substrate; and

(c) a ground plane;

wherein, said substrate is mounted on said ground plane; and

wherein, the patterned region on the front side of said substrate forms a linear conductor and at least one loading patch; said linear conductor has a first end and a second end; each loading patch is connected to said first end of said linear conductor, and each said loading patch is shaped to effectively extend the length of said.linear conductor; and

wherein, the second end of said linear conductor is directly connected to said ground plane.

23.- (New) The reduced size printed monopole antenna element of Claim 22 wherein said ground plane is a conducting ground plane.

24.- (New) The reduced size printed monopole antenna element of Claim 22 wherein said dielectric substrate is perpendicularly mounted on said ground plane.

25.- (New) A dipole antenna array comprising at least one reduced size printed dipole antenna, wherein each said reduced size printed dipole comprises:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on each side of said dielectric substrate; and

(c) via holes;

wherein, the patterned region on the front side of said substrate forms a linear, driven conductor and at least one loading patch; said driven conductor has a feed point and two ends; said driven conductor being excitable at said feed point; each said loading patch being connected to an end of said driven conductor, and each said loading patch being shaped to effectively extend the length of said driven conductor; and wherein, the patterned region on the reverse side of said substrate forms a linear, undriven conductor; and

wherein, said undriven conductor is parallel to said driven conductor, and said undriven conductor is electrically connected to said driven conductor through said via holes.

26.- (New) The dipole antenna array of Claim 25 wherein every reduced size printed dipole antenna is on the same substrate.

27.- (New) The dipole antenna array of Claim 25 further comprising a plane mounted perpendicularly to said substrate, said plane comprising transmission strips on at least one surface of said plane, wherein said reduced size printed dipole antennas and said plane are aligned such that the transmission lines on said plane are electrically connected to the feed points of each reduced size printed dipole antenna.

28.- (New) The dipole antenna array of Claim 27 wherein the width of the transmission lines at each feed point is selected to distribute substantially equal power to each antenna.

29.- (New) The dipole antenna array of Claim 25 wherein each reduced size printed dipole antenna is on a separated substrate.

30.- (New) The dipole antenna array of Claim 29 further comprising planes mounted perpendicularly to said substrates, said perpendicularly mounted planes comprising transmission strips on at least one surface of each plane, wherein said reduced size printed dipole antennas and said planes are aligned such that the transmission lines on said planes are electrically connected to the feed points of each reduced size printed dipole antenna.

31.- (New) The dipole antenna array of Claim 30 wherein the width of the transmission lines at each feed point is selected to distribute substantially equal power to each antenna.

32.- (New) A monopole antenna array comprising at least one reduced size printed monopole antenna, wherein each said reduced size printed monopole antenna comprises:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse

(b) a patterned region on each side of said dielectric substrate;

(c) a ground plane; and

(d) via holes;

wherein said dielectric substrate is mounted over said ground plane; and .

wherein, the patterned region on the front side of said substrate forms a linear, driven conductor and at least one loading patch; wherein said linear, driven conductor has a first end and a second end and each loading patch is connected to the first end of said linear, driven conductor, and each said loading patch is shaped to effectively

extend the length of said driven conductor; and

wherein said linear, driven conductor is excitable by an external conductor; and

wherein the patterned dielectric region on the reverse side of said substrate forms a linear, undriven conductor; wherein said linear, undriven conductor has a first end and a second end; wherein said undriven conductor is parallel to said driven conductor; and wherein the first end of said linear, driven conductor is electrically connected to the first end of said driven conductor through said via holes; and wherein the second end of said undriven conductor is directly connected to said ground plane.

33.- (New) The monopole antenna array of claim 32 wherein every reduced size printed monopole antenna is on the same substrate.

34.- (New) The monopole antenna array of Claim 32 wherein each reduced size printed monopole antenna is on a separated substrate.

35.- (New) An array of parasitic dipole antenna elements comprising at least one parasitic reduced size printed dipole antenna element, wherein each parasitic reduced size printed dipole antenna element comprises:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side; and

(b) a patterned region on said front side of said dielectric substrate;

wherein, the patterned region on the front side of said substrate forms a. linear conductor and loading patches; said linear conductor having a first end and a second end; wherein at least one loading patch is connected to said first end of said conductor, at least one loading patch is connected to said second end of said conductor, and each said loading patch is shaped to effectively extend the length of said conductor.

36..- (New) An array of parasitic monopole antenna elements comprising at least one reduced size printed monopole antenna element, wherein each reduced size printed monopole antenna element comprises:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on the front side of said dielectric substrate; and

(c) a ground plane;

wherein, said substrate is mounted on said ground plane; and

wherein, the patterned region on the front side of said substrate forms a linear conductor and at least one loading patch; said linear conductor has a first end and a second end; each loading patch is connected to said first end of said linear conductor, and each said loading patch is shaped to effectively extend the length of said linear conductor; and

wherein, the second end of said linear conductor is directly connected to said ground plane.

37.- (New) The reduced size printed dipole antenna of Claim 9 further comprising a parasitic dipole director element on the front side of said substrate and a parasitic dipole reflector element on the front side of said substrate, wherein said dipole antenna is positioned between said parasitic director element and said reflector element such that a Yagi-Uda type directional array is formed.

38.- (New) The Yagi-Uda Type directional array of claim 33 wherein said parasitic dipole director element is the parasitic reduced size printed dipole antenna element of claim 21.

39.- (New) The Yagi-Uda Type directional array of claim 33 wherein said parasitic dipole reflector element is the parasitic reduced size printed dipole antenna element of claim 21.

40.- (New) The reduced size printed dipole antenna of Claim 9 further comprising a parasitic dipole director element on the front side of a second dielectric substrate and a parasitic dipole reflector element on the front side of a third dielectric substrate, wherein said dipole antenna is positioned between said parasitic director element and said reflector element such that a Yagi-Uda type directional array is formed.

41.- (New) The Yagi-Uda Type directional array of claim 36 wherein said parasitic dipole director element is the parasitic reduced size printed dipole antenna element of claim 21.

42.- (New) The Yagi-Uda Type directional array of claim 36 wherein said parasitic dipole reflector element is the parasitic reduced size printed dipole antenna element of claim 21.

43.- (New) A reduced size printed dipole antenna comprising:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on each side of said dielectric substrate; and

(c) via holes

wherein, the patterned region on the front side of said substrate forms a linear, driven conductor and at least one loading patch; said driven conductor has a feed point and two ends; said driven conductor being excitable at said feed point; said driven conductor is more narrow than each loading patch; each said loading patch being connected to an end of said driven conductor, and each said loading patch being shaped to effectively extend the length of said driven conductor; and

wherein, the patterned region on the reverse side of said substrate forms a linear, undriven conductor; and

wherein, said undriven conductor is parallel to said driven conductor, and said undriven conductor is electrically connected to said driven conductor through said via holes.

44.- (New) A reduced size printed dipole antenna comprising:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on each side of said dielectric substrate; and

(c) via holes;

wherein, the patterned region on the front side of said substrate forms a linear, driven conductor and at least one loading patch; said driven conductor has a feed point and two ends; said driven conductor being excitable at said feed point; each said loading patch being connected to an end of said driven conductor, and each said loading patch being shaped to effectively extend the length of said driven conductor; and

wherein, the patterned region on the reverse side of said substrate forms a linear, undriven conductor; and

wherein, said undriven conductor is parallel to said driven conductor, and said undriven conductor is electrically connected to said driven conductor through said via holes, and

wherein, the positions of via holes at the ends of said driven and undriven conductors are selected such that an electrical connection from said driven conductor to said undriven conductor through said via holes forms a folded dipole.